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GENESIS: A Science Information System for the Study of Global Change

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GENESIS:

GPS ENvironmental & Earth Science Information System

GPS: The Global Positioning System

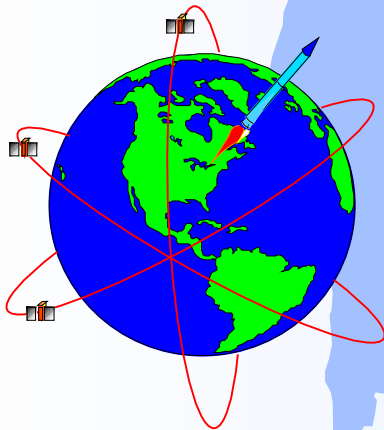**Partners: JPL (Project Lead)**
USC/IMSC (Info Systems Lead)
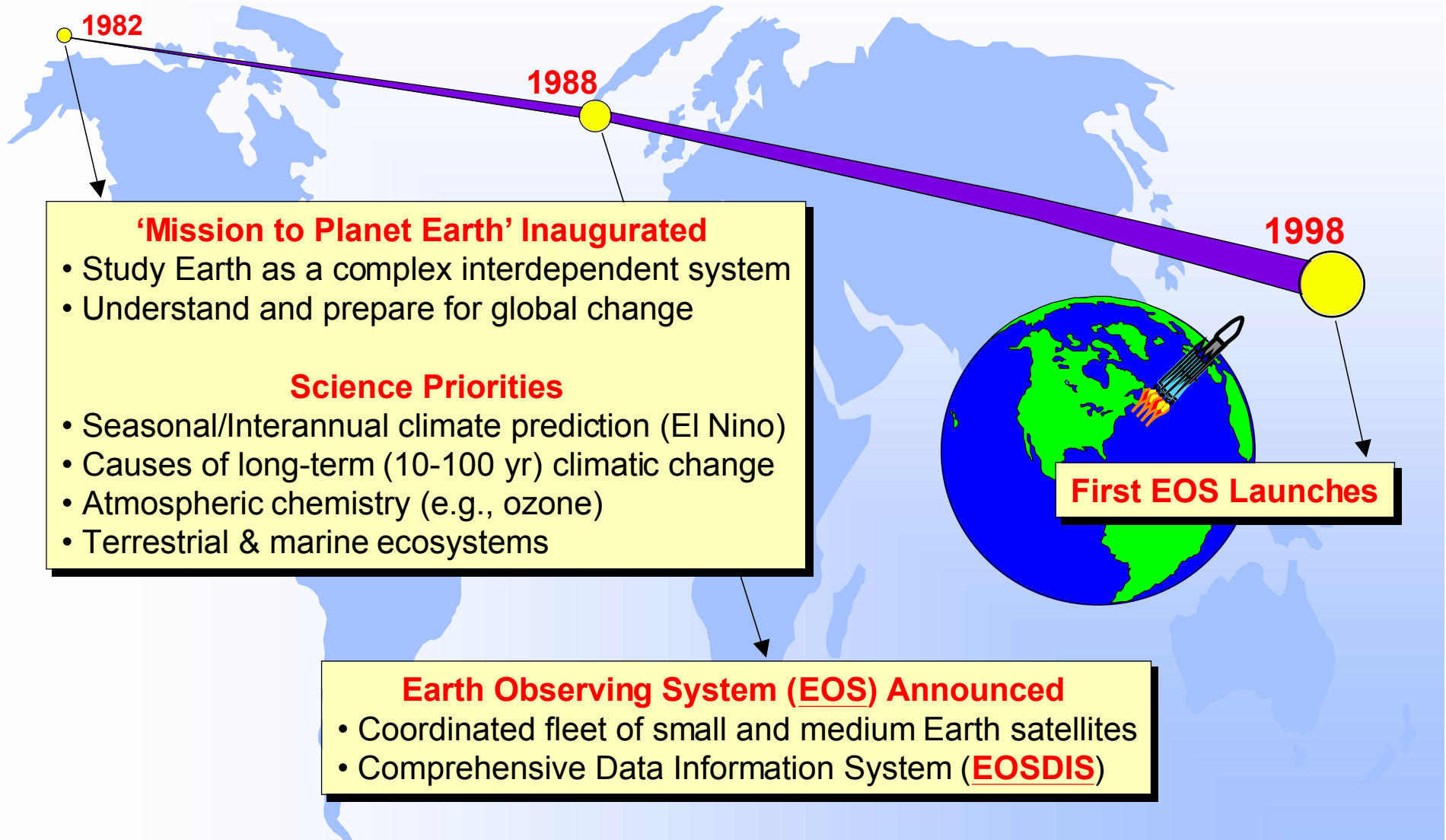**Texas A&M (Science Co-Lead)**
Goddard Inst. (Science Co-Lead)
University of Wisconsin
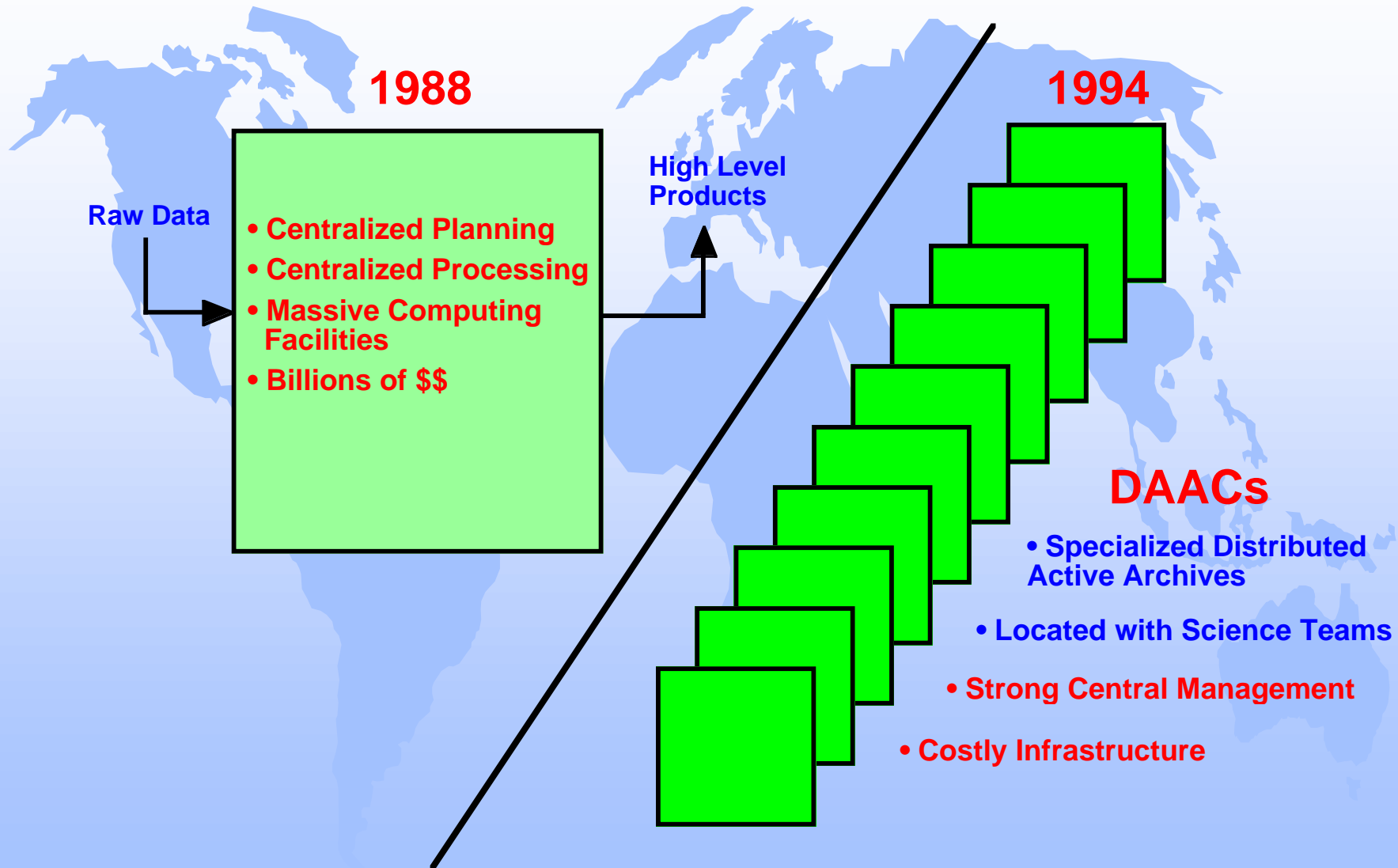**Columbia University**

EARTH SYSTEM SCIENCE AT NASA

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1982

1988

1998

'Mission to Planet Earth' Inaugurated
- Study Earth as a complex interdependent system
- Understand and prepare for global change

Science Priorities
- Seasonal/Interannual climate prediction (El Nino)
- Causes of long-term (10-100 yr) climatic change
- Atmospheric chemistry (e.g., ozone)
- Terrestrial & marine ecosystems

First EOS Launches

Earth Observing System (EOS) Announced
- Coordinated fleet of small and medium Earth satellites
- Comprehensive Data Information System (EOSDIS)

Past Concepts for EOSDIS

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1988

Raw Data

- **Centralized Planning**
- **Centralized Processing**
- **Massive Computing Facilities**
- **Billions of $$**

High Level Products

1994

DAACs

- **Specialized Distributed Active Archives**
- **Located with Science Teams**
- **Strong Central Management**
- **Costly Infrastructure**

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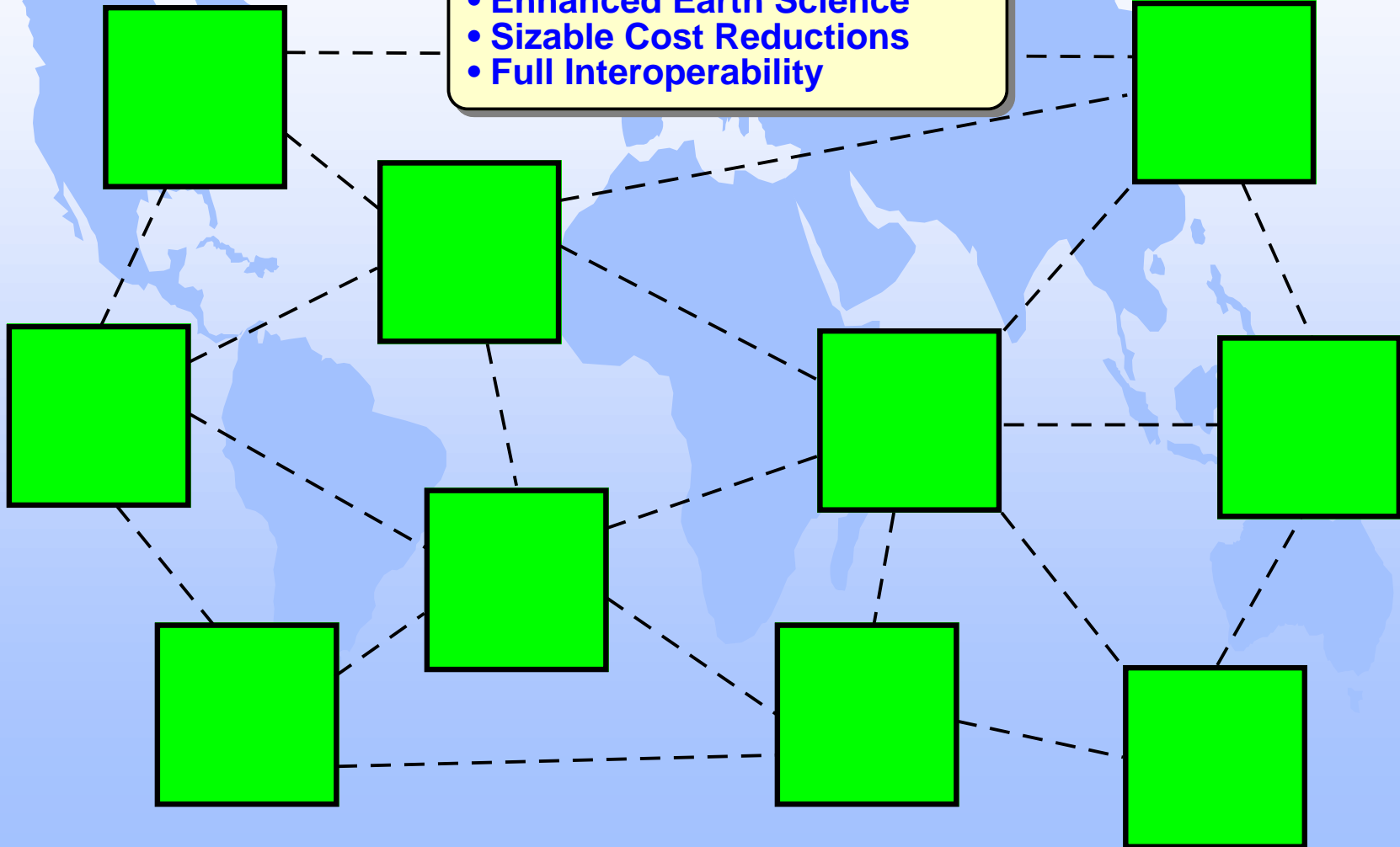
1997: "Earth Science Information Partners"
(or, 'You figure it out')

- Self-Governing Federation
- Innovative Info Technologies
- Enhanced Earth Science
- Sizable Cost Reductions
- Full Interoperability

GENESIS Products & Services

Focus on Atmospheric Occultation Products
- Profiles of <u>refractivity</u>, <u>density</u>, <u>pressure</u>, <u>temp</u>, <u>moisture</u>
- User-specified time and spatial averages of the above
- Global pressure contours, gradients, and derived winds
- Tropopause and boundary layer heights

Other User Services
- Versatile search and query across data centers
- Data subscription: automated notification & delivery
- Powerful data visualization tools: Vis-AD
- Downloadable science analysis tools
- Experimental "data mining" functions
- User-contributed products and tools
- Information: tutorials, papers, FAQs, helpline
- Online publishing

Other GENESIS Features

- Pilot derived from JPL's Distributed Object Manager
- Product system based initially on file management
- Search system based on high performance DBMS
- Will evolve into a true object-oriented system in 2 yrs
- Will draw from latest commercial & research systems:
  - INFORMIX™ Universal Server
  - Oracle-8
  - Paradise (U. Wisc.)
- Adopts Hierarchical Data Format (HDF)
- Web-based interface emphazes Java applets
- Metadata is human-readable, machine parseable
- Allows versatile subsetting and user-specified actions
- Enforces intelligent demand control